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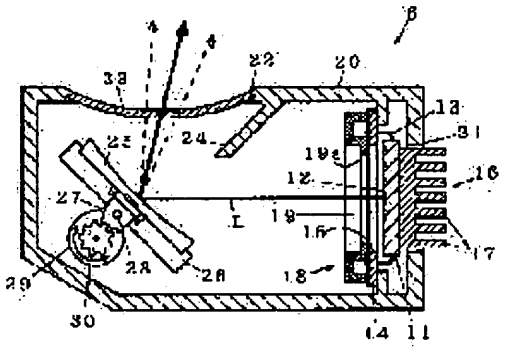
(54) DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a display device excellent in a heat radiating property.

SOLUTION: A display 11 is connected to a circuit board 14 by its terminal part 13. The circuit board 14 has an opening part 15 provided at a point corresponding to a display surface 12 of the display 11. A heat radiating member 16 having a heat radiating fin 17 is provided on the bank surface side of the display 11. The display 11 and the circuit board 14 are stored in a housing 20. A first opening part 21 to expose at least one part of the heat radiating member 16 and a second opening part 22 to project display light L emitted by the display 11 are formed in the housing 20.



LEGAL STATUS

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The sectional view of a display unit showing the example of this invention.
[Drawing 2] The explanatory view of a virtual image showing the above-mentioned example.
[Drawing 3] The perspective view of the reflecting mirror in which the above-mentioned example is shown.
[Drawing 4] The perspective view of the reflecting mirror in which other examples are shown.
[Drawing 5] The sectional view of a display unit showing the conventional example.
[Description of Notations]
11 Fluorescent Indicator Tube (Drop)
12 Screen
14 Circuit Board
15 Opening
16 Radiator Material
18 Concealment Member
20 Housing
21 Opening (First Opening)
22 Opening (Second Opening)
23 Translucent Cover
25 Reflecting Mirror
26 Attachment Component
29 Stepping Motor (Driving Means)

[Translation done.]

* NOTICES *

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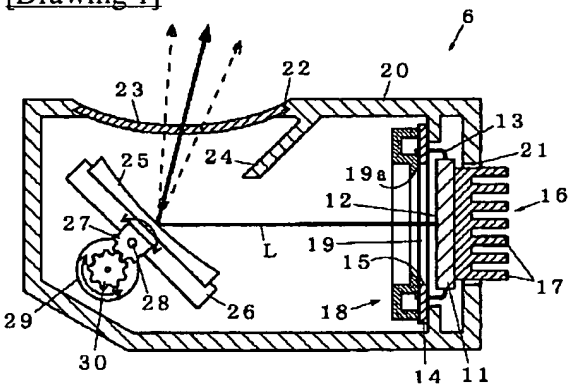
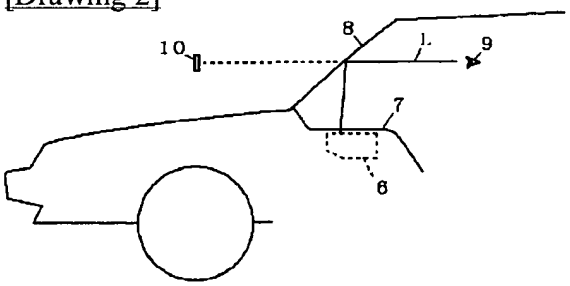
DRAWINGS

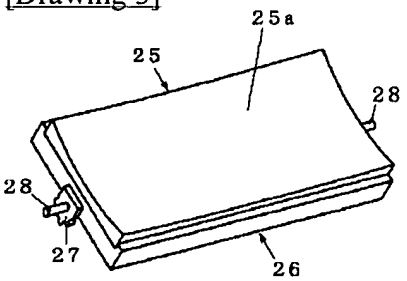
[Drawing 1]



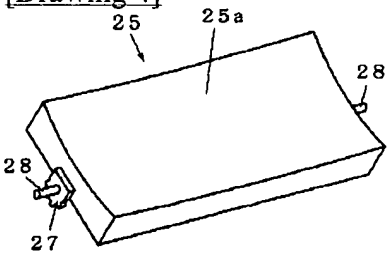
[Drawing 2]



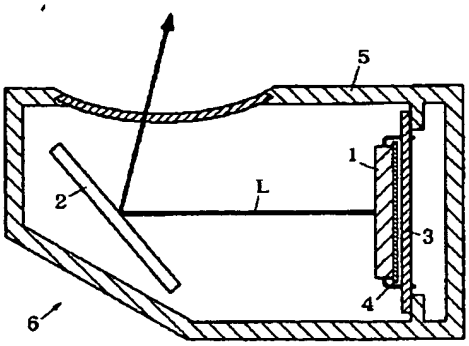
[Drawing 3]



[Drawing 4]



[Drawing 5]



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the display which has a luminescence mold drop (for example, fluorescent indicator tube) accompanied by generation of heat especially about a display.
[0002]
[Description of the Prior Art] Conventionally, as shown in drawing 5 , the indicating equipment which is made to reflect the display light L which a fluorescent indicator tube 1 emits with a reflecting mirror 2, and is projected on the windshield or transflective plate of a car is known, and such an indicating equipment is called the HUD. It connects with the circuit board 3 and a fluorescent indicator tube 1 is driven by the drive circuit (not shown) carried in this circuit board 3. If the temperature rises, it will be known that brightness will fall, and a fluorescent indicator tube 1 sticks a heat sink 4 on the rear face of a fluorescent indicator tube 1, and is reducing the temperature rise of a fluorescent indicator tube 1.
[0003]
[Problem(s) to be Solved by the Invention] However, since the circuit board 3 was arranged in the rear-face side of a fluorescent indicator tube 1, it was difficult to enlarge a heat sink 4. Moreover, it was not emitted out of housing 5, but when long duration lighting of the fluorescent indicator tube 1 was carried out, temperature rose, and a possibility that desired brightness might not be obtained had the heat which the fluorescent indicator tube 1 emitted. That is, since the temperature of the air in housing 5 rose with the heat emitted from the heat sink 4 and the temperature gradient of the air in housing 5 and a heat sink 4 became small, it had the problem that the effectiveness of a heat sink 4 fell. This invention is made in view of the above-mentioned problem, and offers the display excellent in heat dissipation nature.
[0004]
[Means for Solving the Problem] This invention has the drop which has the screen in order to solve said technical problem, and said screen and opening prepared in the corresponding part, has opening to which a part of circuit board to which said drop is connected, radiator material prepared in the rear-face side of said drop, and said radiator material [at least] are exposed, and has housing which holds said drop.
[0005] Moreover, the circuit board to which this invention has the drop which has the screen, and opening prepared in the part corresponding to said screen, and said drop is connected, The radiator material prepared in the rear-face side of said drop, and the first opening to which said a part of radiator material [at least] is exposed, The display light which said indicator emitted has the second opening which carries out outgoing radiation, and has housing which holds said indicator, and the translucent cover prepared in said second opening.
[0006] Moreover, this invention has an attachment component holding the reflecting mirror made to reflect said display light in the direction of said second opening, and said reflecting mirror.
[0007] Moreover, this invention has the driving means which rotates said reflecting mirror.
[0008] Moreover, this invention has the concealment member which hides the perimeter of said opening of said circuit board.
[0009]
[Embodiment of the Invention] The drop 11 is connected with the circuit board 14 by the terminal area 13. The circuit board 14 has the opening 15 prepared in the part corresponding to the screen 12 of a drop 11. The radiator material 16 which has a radiation fin 17 is formed in the rear-face side of a drop 11. An indicator 11 and the circuit board 14 are held in housing 20. The first opening 21 to which a part of radiator material [at

least] 16 is exposed, and the second opening 22 the display light L which the drop 11 emitted carries out [the opening] outgoing radiation are formed in housing 20. Translucent cover 23 is arranged by the second opening 22.

[0010]

[Example] Hereafter, one example which applied this invention to the HUD for cars is explained.

[0011] 6 is a display unit (indicating equipment) and this display unit 6 is arranged in the dashboard 7 of a car (refer to drawing 2). The display light L which the display unit 6 projects is reflected in the direction of an observer 9 by the windshield 8. An observer 9 can make a virtual image 10 able to superimpose on scenery, and can observe it.

[0012] Drawing 1 is the sectional view of the display unit 6. 11 is a fluorescent indicator tube (drop), and this fluorescent indicator tube 11 has the screen 12, and emits the display light L. The fluorescent indicator tube 11 has the terminal area 13, and this terminal area 13 is crooked in the projection screen 12 side from the side face. 14 is the circuit board and this circuit board 14 is connected with the fluorescent indicator tube 11 by the terminal area 13. The circuit board 14 has opening 15 in the part corresponding to the screen 12. 16 is radiator material and this radiator material 16 has many radiation fins 17. The radiator material 16 is pasted up on the rear face of a fluorescent indicator tube 11 with silicone system adhesives.

[0013] 18 is a concealment member and this concealment member 18 is arranged in the front face of the circuit board 14. When the concealment member 18 hides the perimeter of opening 15, sunlight was reflected by the circuit pattern of the circuit board 14, and it has prevented being checked by looking by the observer 9. The window part 19 is formed in opening 15 and a corresponding part at the concealment member 18. It has prevented that incline in the screen 12 side, the display light L is reflected by inner skin, and inner skin 19a of a window part 19 is checked by looking by the observer 9.

[0014] 20 is housing and a fluorescent indicator tube 11 and circuit board 14 grade are held in this housing 20. Opening 21 (the first opening) is formed in housing 20, and the radiation fin 17 of the radiator material 16 is exposed from this opening 21. Moreover, the opening 22 (the second opening) the display light L carries out [the opening] outgoing radiation is formed in housing 20, and the translucent cover 23 which consists of translucency resin (for example, acrylic) is arranged by this opening 22. 24 is a protection-from-light wall, it is formed in housing 20 and one, and outdoor daylight, such as sunlight, carried out incidence of this protection-from-light wall 24 to the fluorescent indicator tube 11, and it has prevented the phenomenon (washout) a virtual image 10 stops being able to be visible easily.

[0015] It is 25 reflecting mirrors and this reflecting mirror 25 reflects the display light L which the fluorescent indicator tube 11 emitted in the opening 22 direction. A reflecting mirror 25 makes resin (for example, polycarbonate) vapor-deposit a metal (for example, aluminum), and forms reflector 25a. Reflector 25a is a concave surface and carries out the enlarged display of the virtual image 10. 26 is an attachment component and the reflecting mirror 25 is pasted up on the attachment component 26 with the pressure sensitive adhesive doudle coated tape. An attachment component 26 consists of resin (for example, ABS), and the gearing section 27 and a shank 28 are formed in one. The shank 28 is supported to revolve by bearing (not shown) prepared in housing 20.

[0016] 29 is a stepping motor (driving means), can rotate a reflecting mirror 25 with this stepping motor 29, and can adjust the direction of outgoing radiation of the display light L. 30 is a gearing, and this gearing 30 is attached in the rotation shaft of a stepping motor 29, and is meshed with the gearing section 27. an observer 9 adjusts the include angle of a reflecting mirror 25 so that a switch (not shown) may be operated and the display light L may be reflected in the location of an eye (that is, a virtual image 10 can be checked by looking -- as).

[0017] According to the example described above, since the radiation fin 17 of the radiator material 16 is exposed out of housing 20, heat dissipation nature is good. Moreover, since the circuit board 14 is arranged in the screen 12 side of a fluorescent indicator tube 11, the comparatively big radiator material 16 can be arranged.

[0018] In addition, although a reflecting mirror may really be formed for the gearing section and a shank with resin as shown in drawing 4 , it is desirable to prepare an attachment component like the above-mentioned example, HIKE based on having formed the gearing section and a shank in one occurs, and there is no possibility that distortion may arise in a reflector. Moreover, although the above-mentioned example reflected the display light L in the direction of an observer 9 by the windshield, for example, it may form a transflective plate in housing and may make it reflect the display light L with this transflective plate. Moreover, although the

attachment component 26 consisted of resin, you may be metal, for example. Moreover, although the drop of the above-mentioned example was a fluorescent indicator tube 11, it may be a liquid crystal display which has the light source which illuminates a liquid crystal display component and this liquid crystal display component from back, for example, and can emit the heat of the light source to the exterior of housing 20.

[0019]

[Effect of the Invention] The circuit board to which this invention has opening prepared in the drop which has the screen, and said screen and a corresponding part, and said drop is connected, The radiator material prepared in the rear-face side of said drop, and housing which has opening to which said a part of radiator material [at least] is exposed, and holds said drop, Since it ****, comparatively big radiator material can be arranged since the circuit board is arranged in the screen side of a drop, and a part of radiator material is exposed to the exterior of housing, heat dissipation nature is excellent.

[0020] Moreover, the circuit board to which this invention has the drop which has the screen, and opening prepared in the part corresponding to said screen, and said drop is connected, The radiator material prepared in the rear-face side of said drop, and the first opening to which said a part of radiator material [at least] is exposed, Housing with which the display light which said indicator emitted has the second opening which carries out outgoing radiation, and holds said indicator, Since it has the translucent cover prepared in said second opening, comparatively big radiator material can be arranged since the circuit board is arranged in the screen side of a drop, and a part of radiator material is exposed to the exterior of housing, heat dissipation nature is excellent.

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CLAIMS

[Claim(s)]
[Claim 1] The display characterized by having the drop which has the screen, the circuit board to which it has opening prepared in said screen and a corresponding part, and said drop is connected, the radiator material prepared in the rear-face side of said drop, and housing which has opening to which said a part of radiator material [at least] is exposed, and holds said drop.
[Claim 2] The drop which has the screen, and the circuit board to which it has opening prepared in the part corresponding to said screen, and said drop is connected, Housing which has the first opening to which a part of radiator material prepared in the rear-face side of said drop and said radiator material [at least] are exposed, and the second opening in which the display light which said drop emitted carries out outgoing radiation, and holds said drop, The display characterized by having the translucent cover prepared in said second opening.
[Claim 3] The reflecting mirror made to reflect said display light in the direction of said second opening in a display according to claim 2, and the display characterized by having an attachment component holding said reflecting mirror.
[Claim 4] The display characterized by having the driving means which rotates said reflecting mirror in a display according to claim 3.
[Claim 5] The display characterized by having the concealment member which hides the perimeter of said opening of said circuit board in a display given in any of claim 1 thru/or claim 4 they are.

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